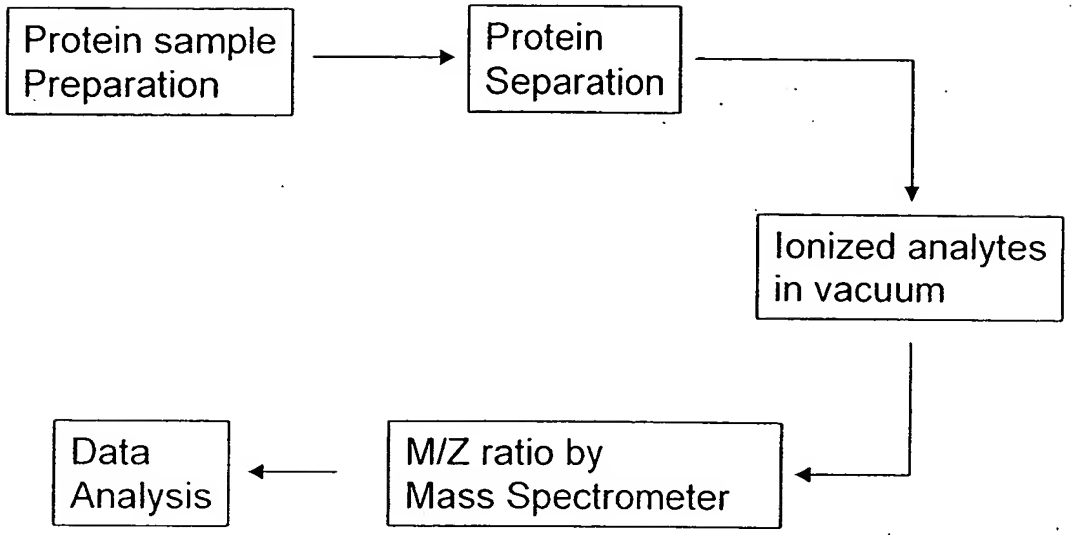
Protein sample Preparation
Protein Separation
Ionized analytes in vacuum
M/Z ratio by Mass Spectrometer
Data Analysis

FIG. 1

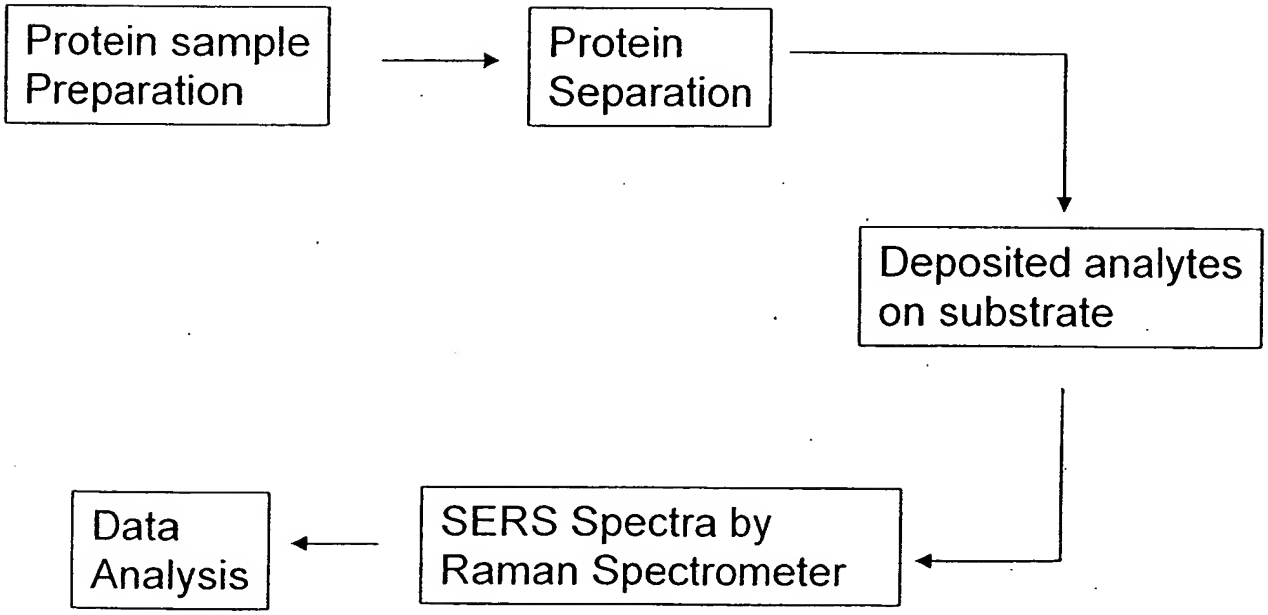
Protein sample Preparation
Protein Separation
Deposited analytes on substrate
SERS Spectra by Raman Spectrometer
Data Analysis

FIG. 2

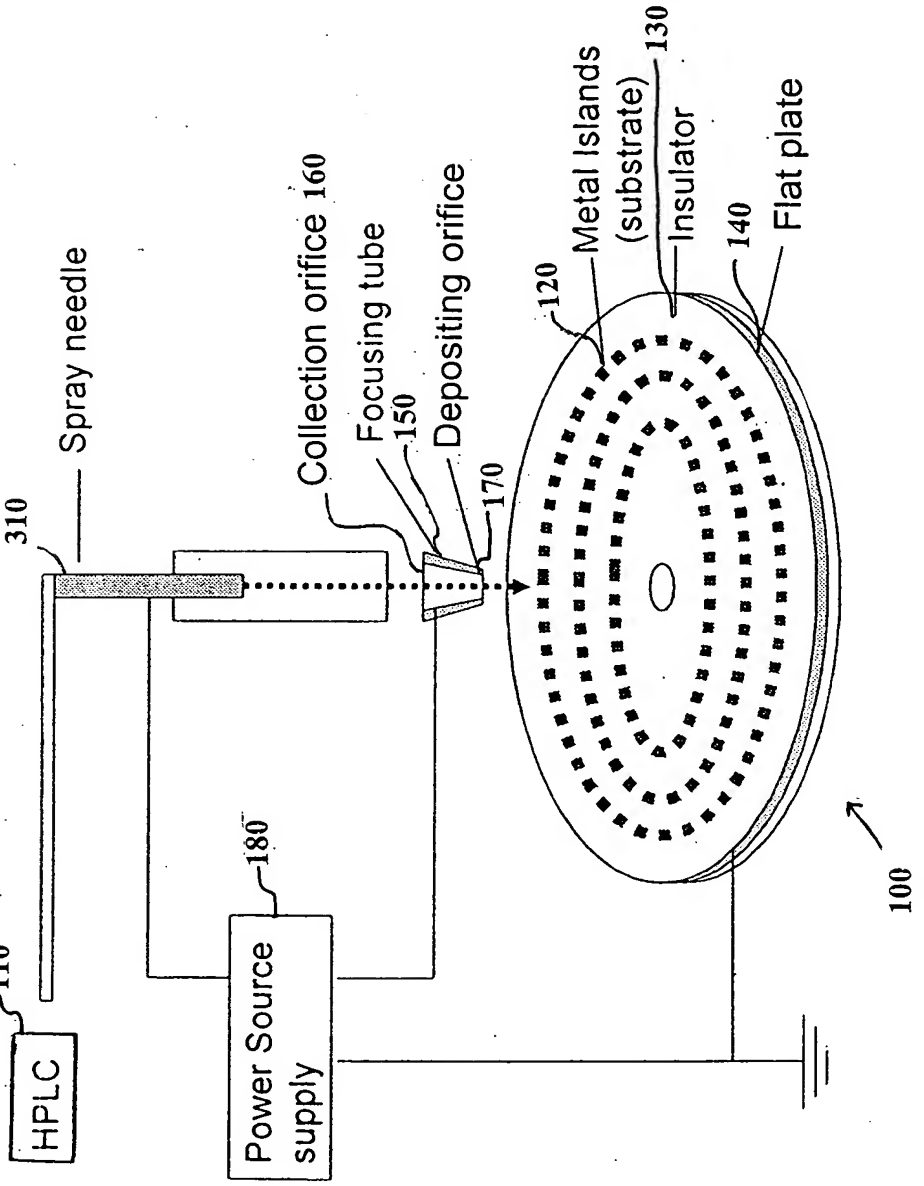
Spray needle
310
Collection orifice 160
Focusing tube
150
Depositing orifice
170
Metal Islands
(substrate)
130
Insulator
120
140
Flat plate
100
110
HPLC
180
Power Source
supply

FIG. 3

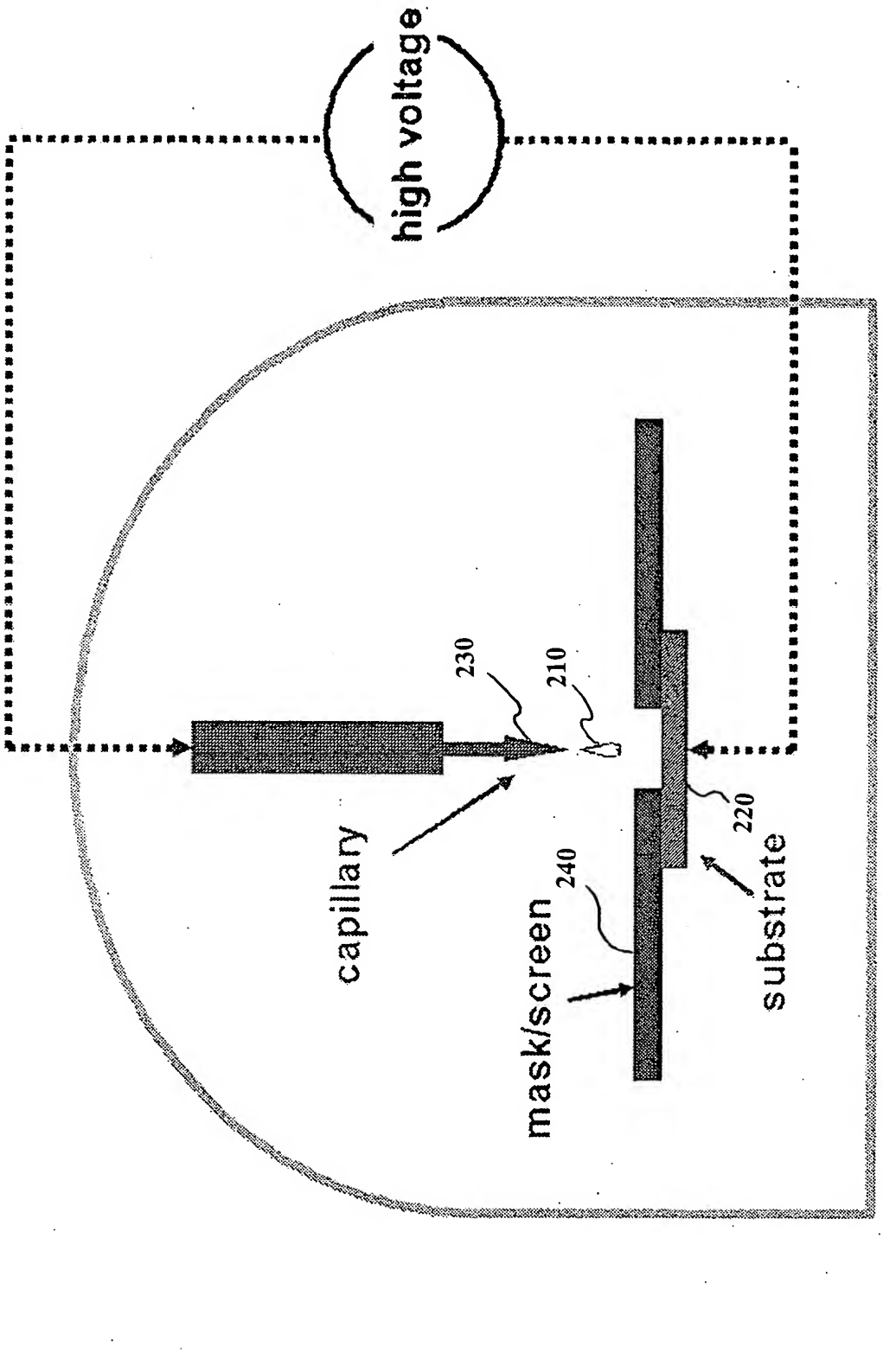
high voltage
230
210
capillary
240
mask/screen
220
substrate
200

FIG. 4

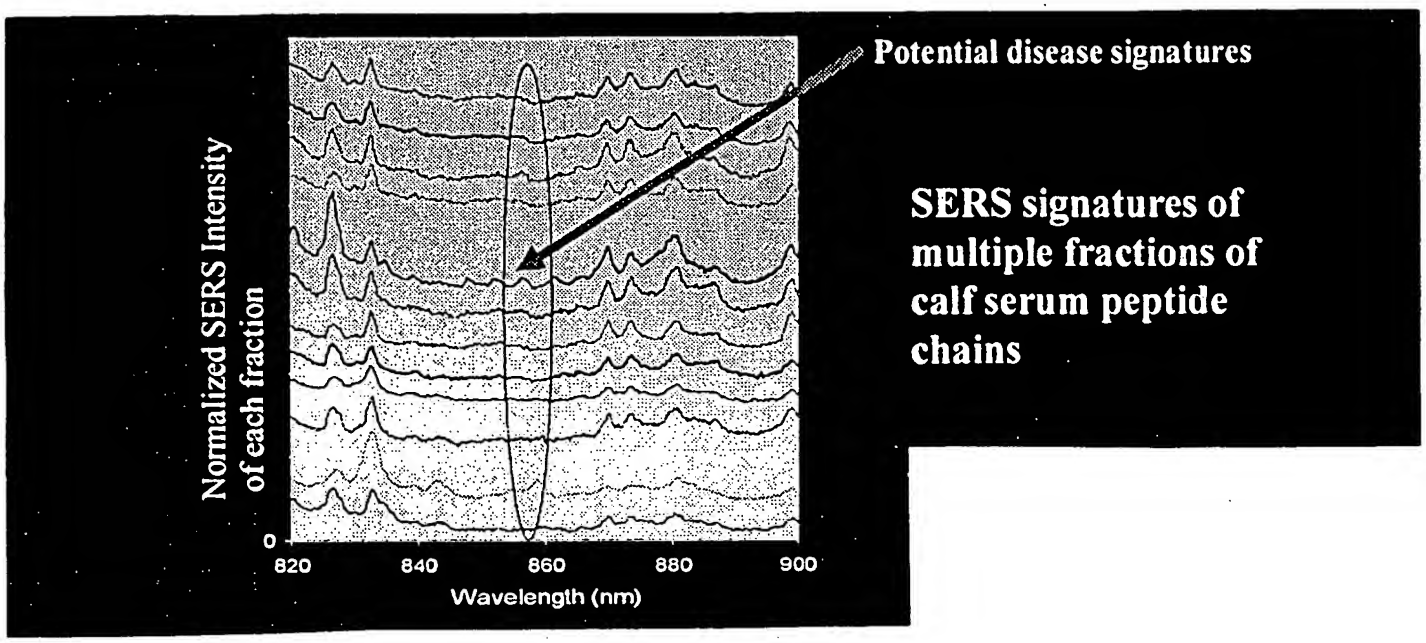

FIG. 5

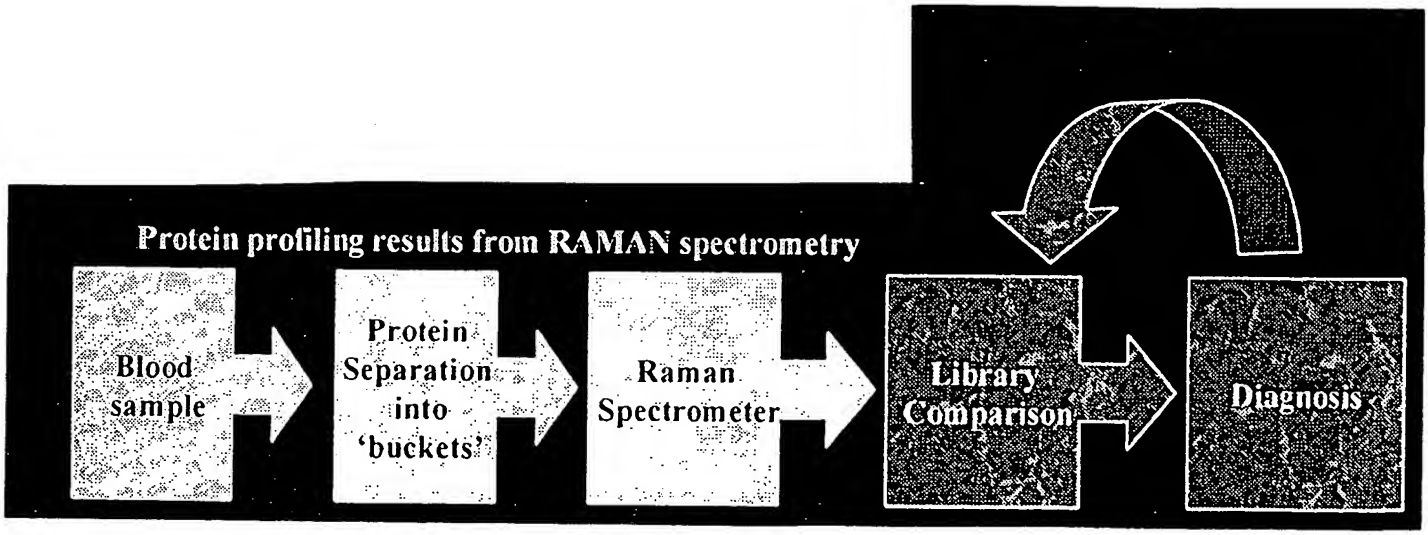

FIG. 6

BEST AVAILABLE COPY

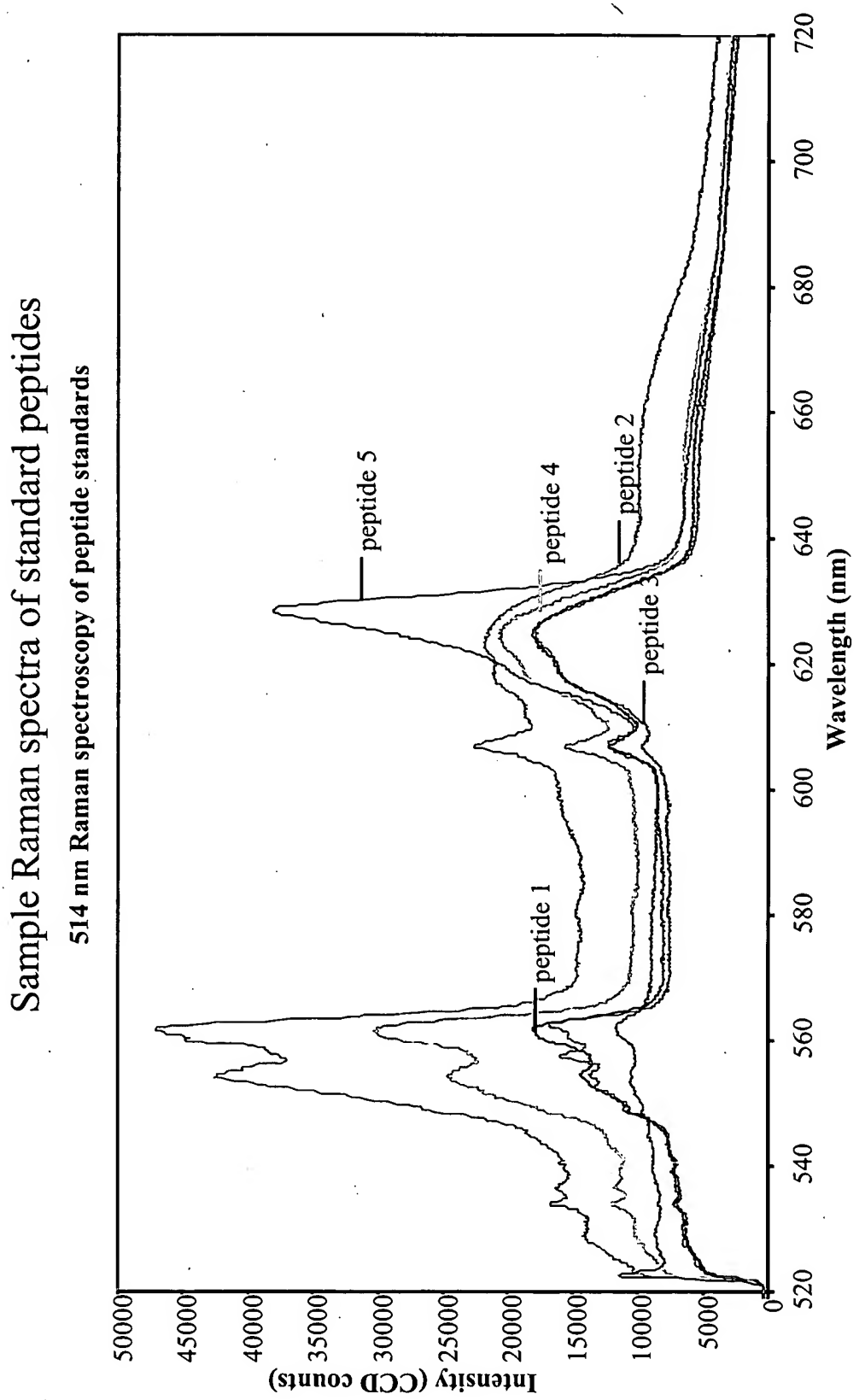
Sample Raman spectra of standard peptides
514 nm Raman spectroscopy of peptide standards
Intensity (CCD counts)
Wavelength (nm)
peptide 1
peptide 2
peptide 3
peptide 4
peptide 5
0
5000
10000
15000
20000
25000
30000
35000
40000
45000
50000
520
540
560
580
600
620
640
660
680
700
720

FIG. 7

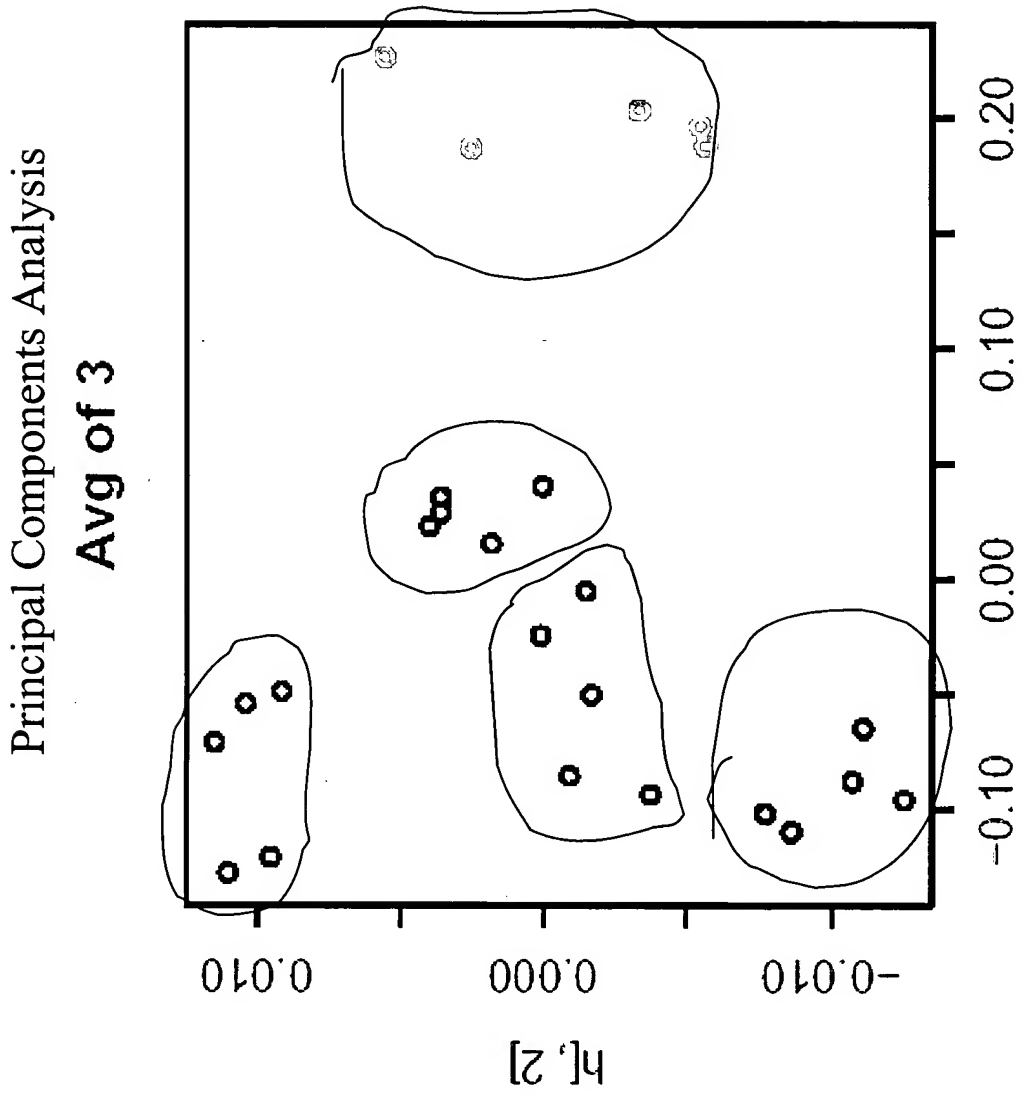
Principal Components Analysis
Avg of 3
h[, 2]
-0.010
0.000
0.010
h[, 1]
-0.10
0.00
0.10
0.20

FIG. 8

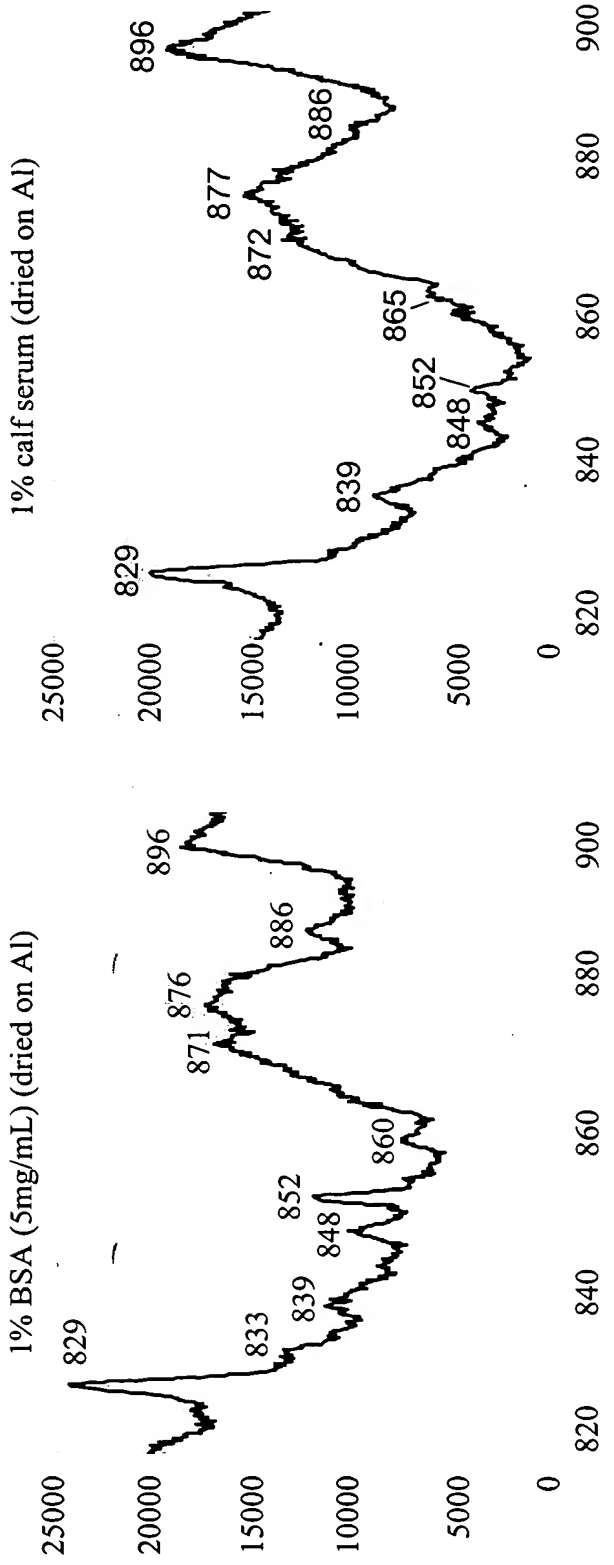
SERS Spectra of BSA & Calf Serum
1% BSA (5mg/mL) (dried on Al)
1% calf serum (dried on Al)
25000
20000
15000
10000
5000
0
820
840
860
880
900
829
833
839
848
852
860
871
876
886
896
829
839
848
852
865
872
877
886
896

FIG. 9A

FIG. 9B

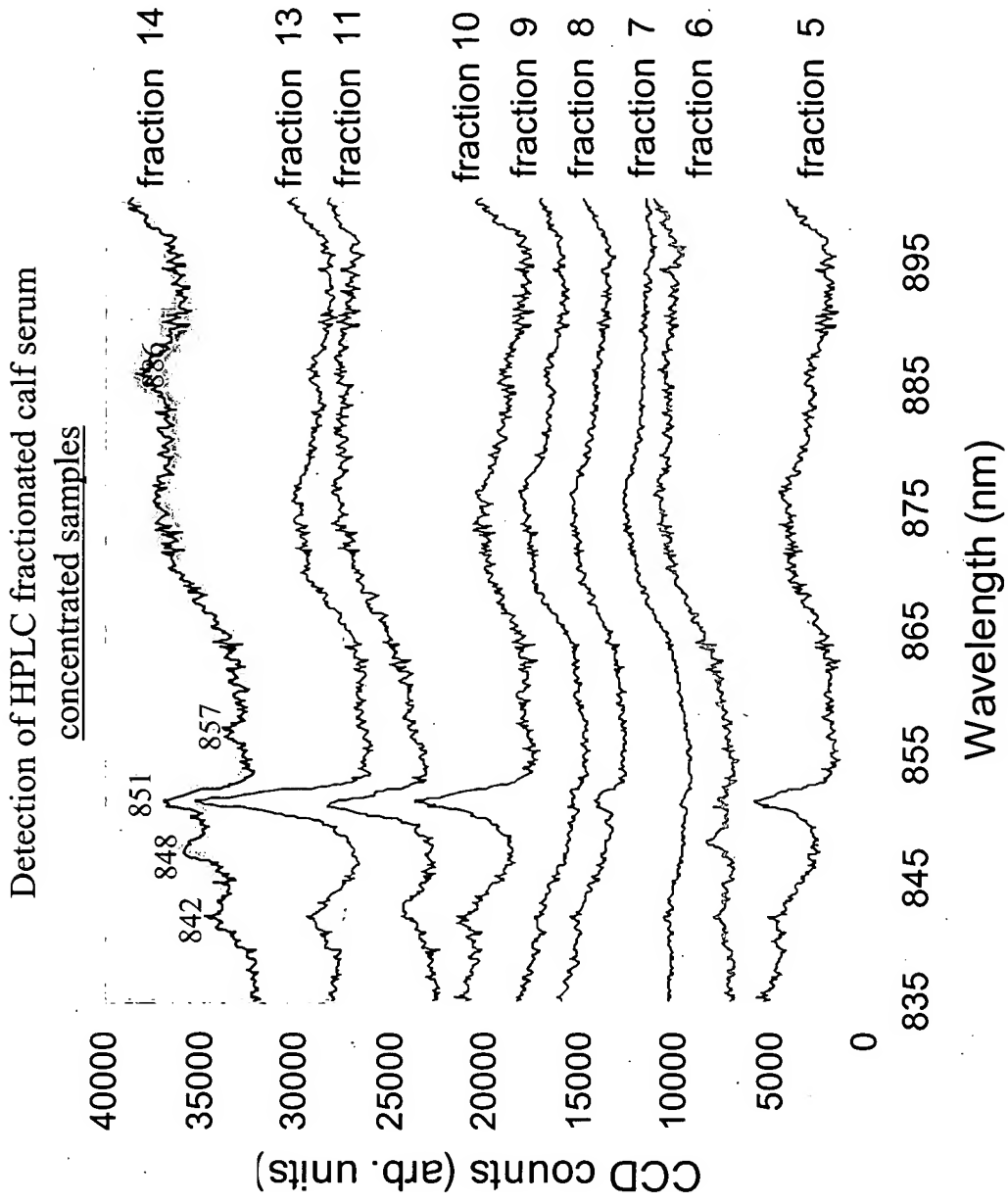
Detection of HPLC fractionated calf serum
concentrated samples
CCD counts (arb. units)
Wavelength (nm)
fraction 14
fraction 13
fraction 11
fraction 10
fraction 9
fraction 8
fraction 7
fraction 6
fraction 5
842
848
851
857
886
40000
35000
30000
25000
20000
15000
10000
5000
0
835
845
855
865
875
885
895

FIG. 10

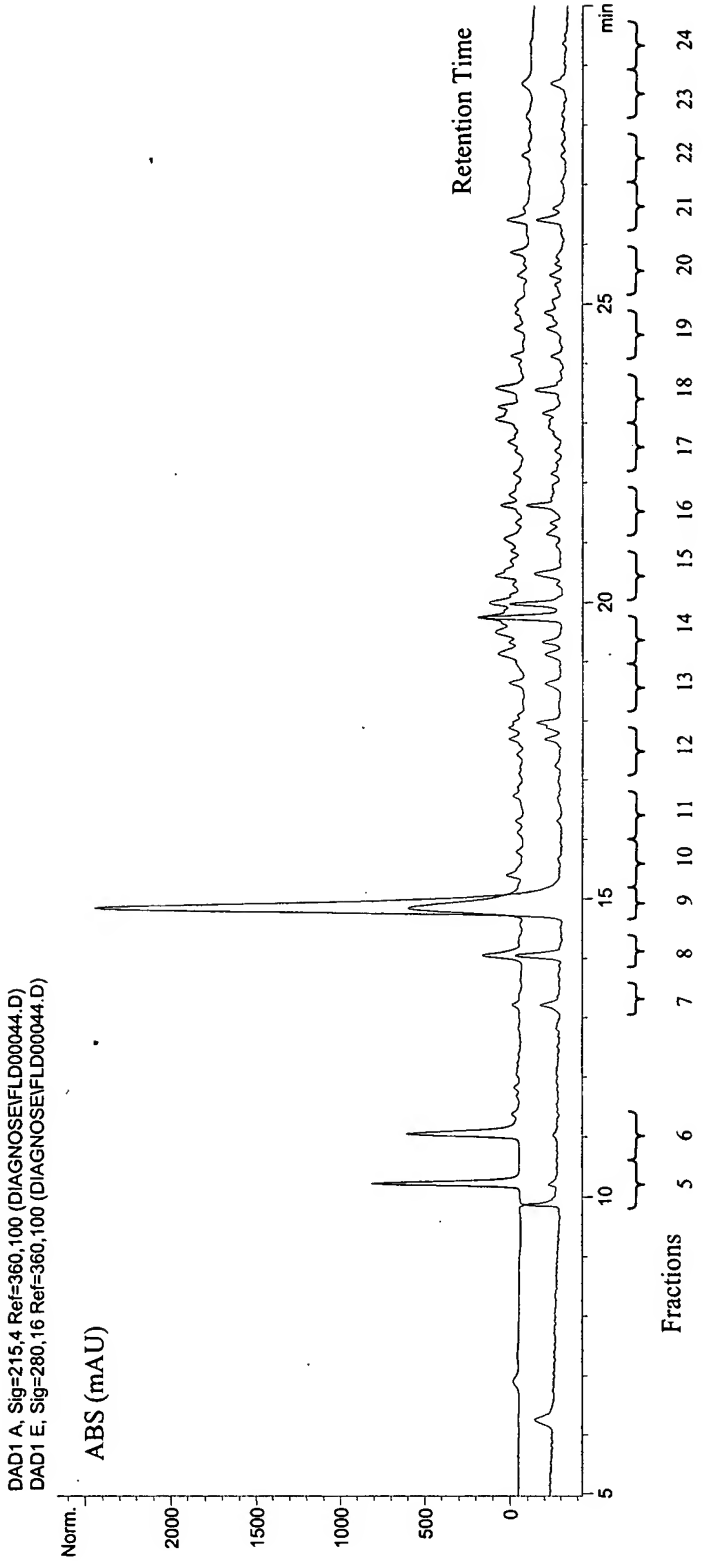
DAD1 A, Sig=215,4 Ref=360,100 (DIAGNOSE\FLD00044.D)
DAD1 E, Sig=280,16 Ref=360,100 (DIAGNOSE\FLD00044.D)
ABS (mAU)
Norm.
2000
1500
1000
500
0
Retention Time
min
5
10
15
20
25
Fractions
5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

FIG. 11A

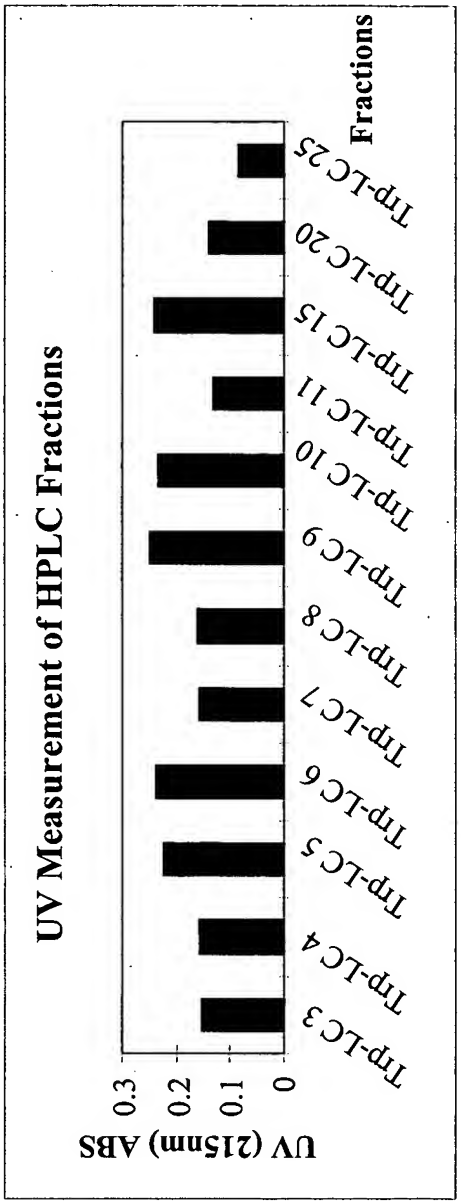
UV Measurement of HPLC Fractions
UV (215nm) ABS
0.3
0.2
0.1
0
Fractions
Trp-LC 3
Trp-LC 4
Trp-LC 5
Trp-LC 6
Trp-LC 7
Trp-LC 8
Trp-LC 9
Trp-LC 10
Trp-LC 11
Trp-LC 15
Trp-LC 20
Trp-LC 25

FIG. 11B

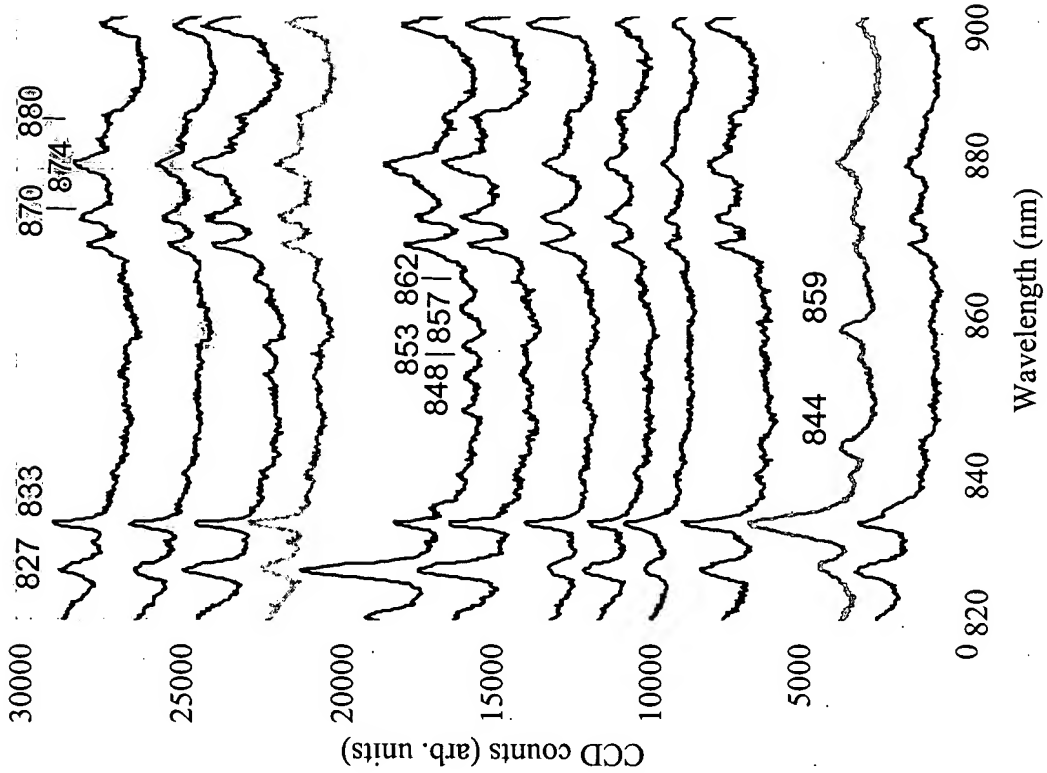
CCD counts (arb. units)
30000
25000
20000
15000
10000
5000
0
820
840
860
880
900
Wavelength (nm)
827
833
844
848
853
857
859
862
870
874
880

FIG. 11C